Check List 2007: 3(1)
ISSN: 1809-127X

LISTS OF SPECIES

Mayflies (Insecta: Ephemeroptera) of Yellowstone National Park, U.S.A.

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Abstract

The Ephemeroptera (Insecta) fauna of Yellowstone National Park consists of 46 species in 24 genera among eight families. These species are listed, and fifteen of the species (including collection data) are reported for the first time. Another 13 species have been taken adjacent to the park in Wyoming and Montana and noted as expected to occur in the park.

Introduction

Yellowstone National Park (Figure 1) was established as the world's first national park in 1872, and remains today the largest national park in the conterminous U.S.A. It comprises 898,714 ha, 91 % of which is in the northwestern corner of the state of Wyoming, with 7.6 % in adjacent Montana, and 1.4 % in adjacent Idaho. The roughly rectangular area is more than 100 km from north to south, and over 86 km from east to west. Approximately 10 % of the park is covered in water, including a variety of lakes and both high and low gradient streams and rivers. Although the climate has an average min/max temperature range of -13° C to -2° C in January, to 7° C to 27° C in July, some seasonal stream temperatures are moderated to various degrees because of geothermal water sources (Anonymous 1998).

Published reports of Ephemeroptera species from Yellowstone National Park have been scattered throughout the literature since the first report of a mayfly from there given by Eaton (1884) for what is now known as *Drunella grandis* (Eaton). Historically, 29 mayfly species have been reported from the park. Besides the Eaton report cited above, first reports for these species included eight in the 1920s, 11 in the 1930s, one in the 1940s, one in the 1950s, six in the 1960s, one in the 1980s, and one in the 2000s. This pattern is typical of the explosion of Ephemeroptera data generated in North America in the 1920s and 1930s (primarily by James McDunnough and Jay Traver), which McCafferty (2001) has documented and referred to as the golden age of discovery of Ephemeroptera in North America. Yellowstone has been the type locality of four of these species: *Acerpenna thermophilos* (McDunnough) (McDunnough 1926), *Ecdyonurus criddlei* (McDunnough) (McDunnough 1927), *Caudatella heterocaudata* (McDunnough) (McDunnough 1929), and *Rhithrogena futilis* McDunnough (McDunnough 1934). Thus, with the exception of an informal record by Arbona (1980), and a record given by Slater and Kondratieff (2004), it has been nearly 40 years since significant new species records have been reported from the park. A few other species have been listed in various park lists or reports (grey literature). These are not treated here because identifications cannot be verified and because it is not the policy of Check List to include such species.

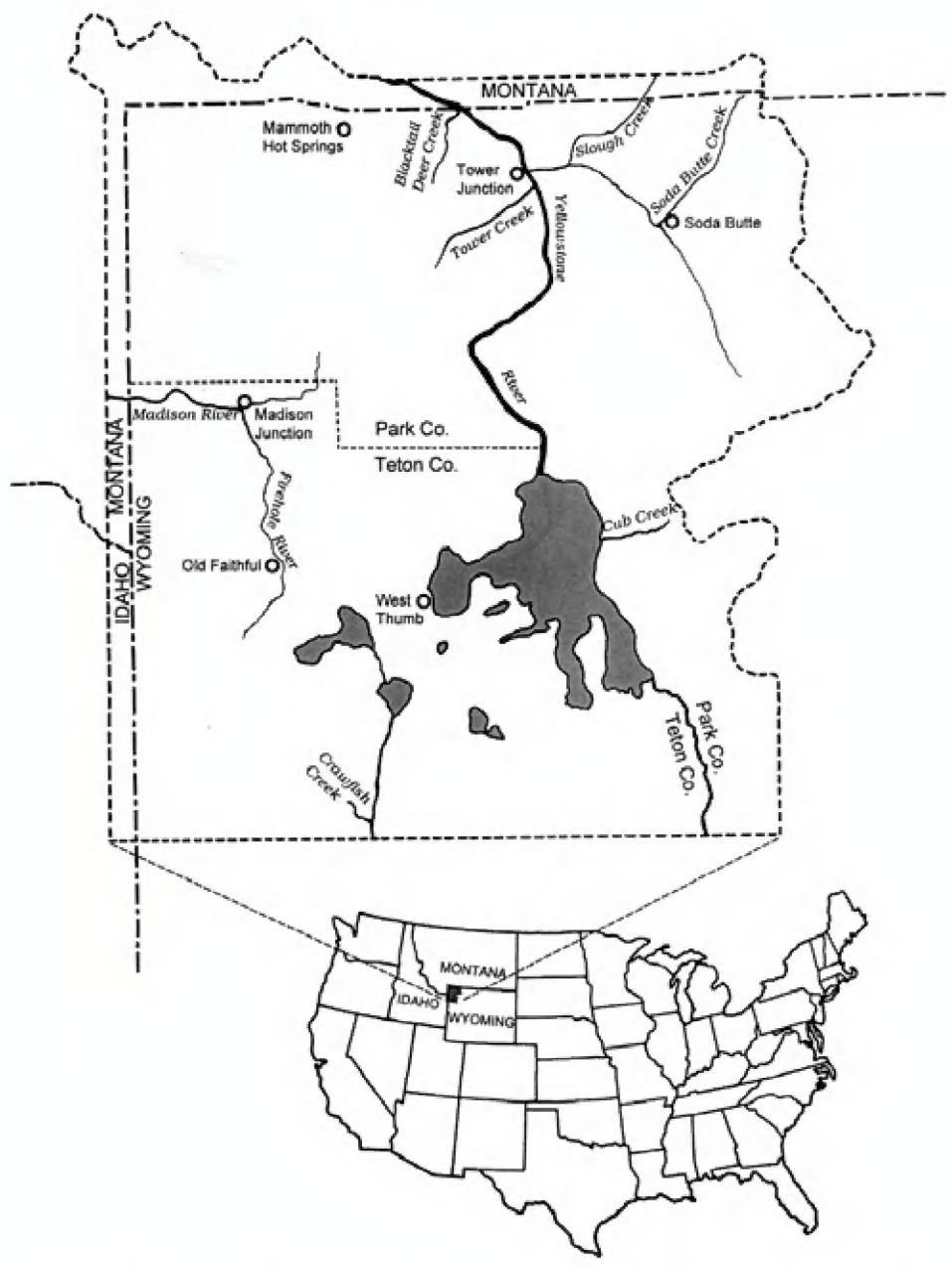

Figure 1. Yellowstone National Park; location within the U.S.A. and pertinent landmarks.

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New records for an additional 15 species of Ephemeroptera are presented below, based on the identification of materials donated to the Purdue Entomological Research Collection, Purdue University, West Lafayette, Indiana, U.S.A., by the late George Edmunds (University of Utah) in the 1990s. A checklist of all Yellowstone species is presented in alphabetical order by taxon. Newly reported species are asterisked within the list and new record data are annotated for them. Previous species are annotated with a reference to their first, but not necessarily only, published Yellowstone record. All previous and new records are from the main portion of the park encompassed within the boundaries of Wyoming, including all of Park County and northern Teton County. A discussion of additional species that should eventually be found in the park follows the checklist.

Annotated checklist of species

Ameletidae

**Ameletus bellulus* Zloty, 1996: Larvae, Park County, no other locale data, 10-VII-1961, R. Muttkowski.
Ameletus sparsatus McDunnough, 1931: Arbona (1980).
**Ameletus validus* McDunnough, 1923: Larvae, Park County, Antelope Creek, 2 miles south of Tower Junction, 17-VIII-1959, R. Muttkowski.
Ameletus velox Dodds, 1923: McDunnough (1934).

Baetidae

**Acentrella insignificans* (McDunnough), 1926: Larvae, Teton County, Crawfish Creek, 10 miles south of West Thumb, 27-VI-1964, S. Jensen, J Richardson.
Acerpenna thermophilos (McDunnough), 1926: McDunnough (1926).
**Baetis bicaudatus* Dodds, 1923: Larvae, Park County, Blacktail Deer Creek, 7 miles east of Mammoth Hot Springs, 26-VI-1964, S. Jensen, J. Richardson.
**Baetis flavistriga* McDunnough, 1921: Larvae, Park County, Slough Creek, at Slough Creek Camp, 17-VIII-1959, G. Edmunds, W. Peters.
Baetis tricaudatus Dodds, 1923: Traver (1935).
Callibaetis ferrugineus (Walsh), 1862: Traver (1935) as *C. fuscus* Dodds, 1923.
**Centroptilum conturbatum* McDunnough, 1929: Larvae, Teton County, Crawfish Creek, 10 miles south of West Thumb, 27-VI-1964, S. Jensen, J. Richardson.
Diphetor hageni (Eaton), 1885: Traver (1935).
**Fallceon quilleri* (Dodds), 1923: Larvae, Teton County, Firehole River, 16 miles south of Madison Junction, 17-VIII-1959, G. Edmumds, W. Peters.
**Heterocloeon anoka* (Daggy), 1945: Larvae, Teton County, Firehole River, 6 miles south of Madison Junction, 16-VIII-1959, G. Edmunds, W. Peters.

Ephemerellidae

Attenella margarita (Needham), 1927: Allen and Edmunds (1961a).
Caudatella heterocaudata (McDunnough), 1929: McDunnough (1929).
Caudatella hystix (Traver), 1934: Allen and Edmunds (1961b).
Drunella coloradensis (Dodds), 1923: Needham (1927).
Drunella doddsii (Needham), 1927: Needham (1927).
Drunella flavilinea (McDunnough), 1926: McDunnough (1935) as *Ephemerella lapidula* McDunnough, 1935.
Drunella grandis (Eaton), 1884: Eaton (1884).
Drunella spinifera (Needham), 1927: McDunnough (1934).
Ephemerella alleni Jensen and Edmunds, 1966: Jensen and Edmunds (1966).
Ephemerella aurivillii (Bengtsson), 1908: Vincent (1967).

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Ephemerella dorothea Needham, 1908: Allen and Edmunds (1965) as *E. infrequens* McDunnough, 1924.
Ephemerella excrucians Walsh, 1862: Needham (1927) as *E. inermis* Eaton, 1884.
Serratella tibialis (McDunnough), 1924: Traver (1934) as *E. angusta* Traver, 1934.
Timpanoga hecuba (Eaton), 1884: Allen and Edmunds (1959).

Ephemeridae

Ephemera simulans Walker, 1853: Spieth (1940).

Heptageniidae

Cinygmula mimus (Eaton), 1885: Slater and Kondratieff (2004).
Ecdyonurus criddlei (McDunnough), 1927: McDunnough (1927).
Epeorus albertae (McDunnough), 1924: McDunnnough (1929).
**Epeorus deceptivus* (McDunnough), 1924: Larvae, Park County, Tower Creek, at Tower Junction, 17-VIII-1959, G. Edmunds, W. Peters.
Epeorus grandis (McDunnough), 1924: Vincent (1967).
Epeorus longimanus (Eaton), 1885: Muttkowski and Smith (1929).
**Heptagenia elegantula* (Eaton), 1885: Larvae, Teton County, Crawfish Creek, 10 miles south of West Thumb, 27-VI-1964, S. Jensen, J. Richardson.
**Heptagenia solitaria* McDunnough, 1924: Larvae, Teton County, Crawfish Creek, 5-VI-1946, G Edmunds.
Rhithrogena futilis McDunnough, 1934: McDunnough (1934).
Rhithrogena hageni Eaton 1885: Vincent (1967).
**Rhithrogena morrisoni* (Banks), 1924: Larvae, Park County, Soda Butte Creek, 1 mile east of Soda Butte, 17-VIII-1959, G Edmunds, W. Peters.
**Rhithrogena robusta* Dodds, 1923: Larvae, Park County, Cub Creek, 15-VI-1949, G. Edmunds.
Rhithrogena undulata (Banks), 1924: Traver (1935).

Leptohyphidae

Tricorythodes explicatus (Eaton), 1892: McDunnough (1931).
**Tricorythodes minutus* Traver, 1935: Adults, Teton County, Madison River, 10-X-1947, F. Harmston.

Leptophlebiidae

**Leptophlebia cupida* (Say), 1823: Adult, Teton County, Firehole River, nr Old Faithful, 21-VI-1949, G. Edmunds.

Siphlonuridae

Siphlonurus occidentalis (Eaton), 1885: Traver (1935).

Discussion

All species listed above are boreal northwestern or more widespread North American species (McCafferty 2006), and none show an unusual distribution within Yellowstone National Park. In addition to the 45 species listed above, there are another 13 species that I have seen in the Purdue Entomological Research Collections from just south of the park in Teton County, Wyoming, or in adjacent areas of Gallatin and Park Counties, Montana that may eventually be taken within the park proper. These include *Ameletus celer* McDunnough, *A. cooki* McDunnough, *A. majusculus* Zloty, *A. oregonensis* McDunnough, *A. similior* McDunnough, *A. vernalis* McDunnough, *Caenis youngi* Roemhild, *Centroptilum asperatum* Traver, *Cinygmula tarda* (McDunnough), *Ecdyonurus sinplicioides* (McDunnough), *Leptophlebia nebulosa* (Walker), *Parleptophlebia packii* (Needham), and *P. temporalis* (McDunnough).

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Acknowledgements

I thank R. P. Randolph (University of California at Davis) and A. V. Provonsha (Purdue University) for their assistance.

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Received November 2006
Accepted December 2007
Published online January 2007